Experiments in active noise control in buildings. Local and global approaches.

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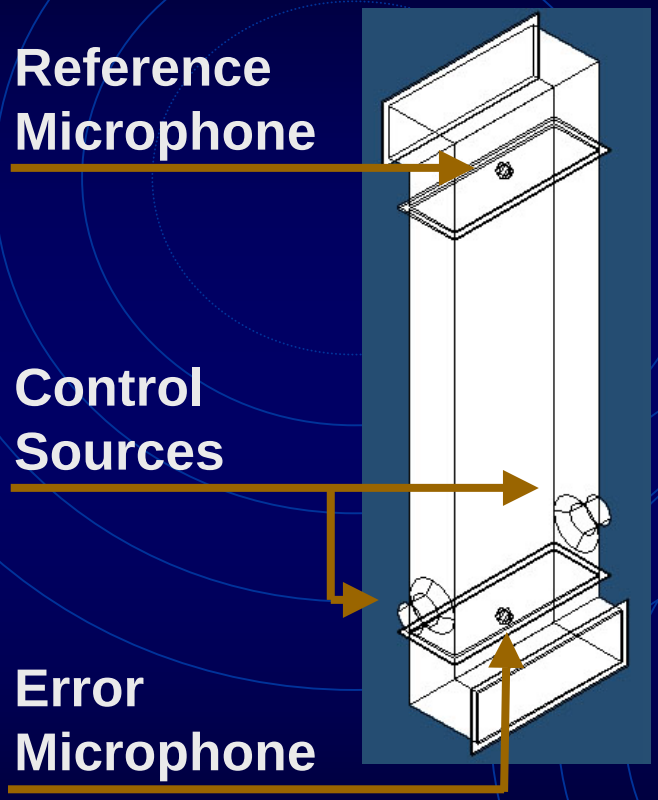
ISACBAT :

ISolation ACtive du bruit dans le BATiment

This project (2001-2005) aims at studying active noise control solutions in buildings, in order to reduce traffic noise emissions.
Applications in ventilation ducts, double walls or shutter boxes.

Active ventilation duct



- insertion in an outer wall : **"Z" shape**
- ensure a **sufficient air flow** : 45x14 cm^2
- absorption in medium and high frequencies
  - **Synthetic foam**

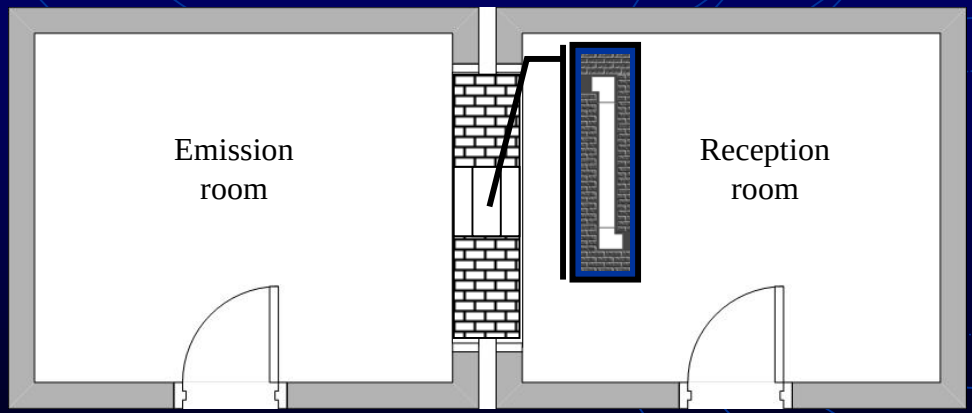
Industrial partnership :

-Close s.a.

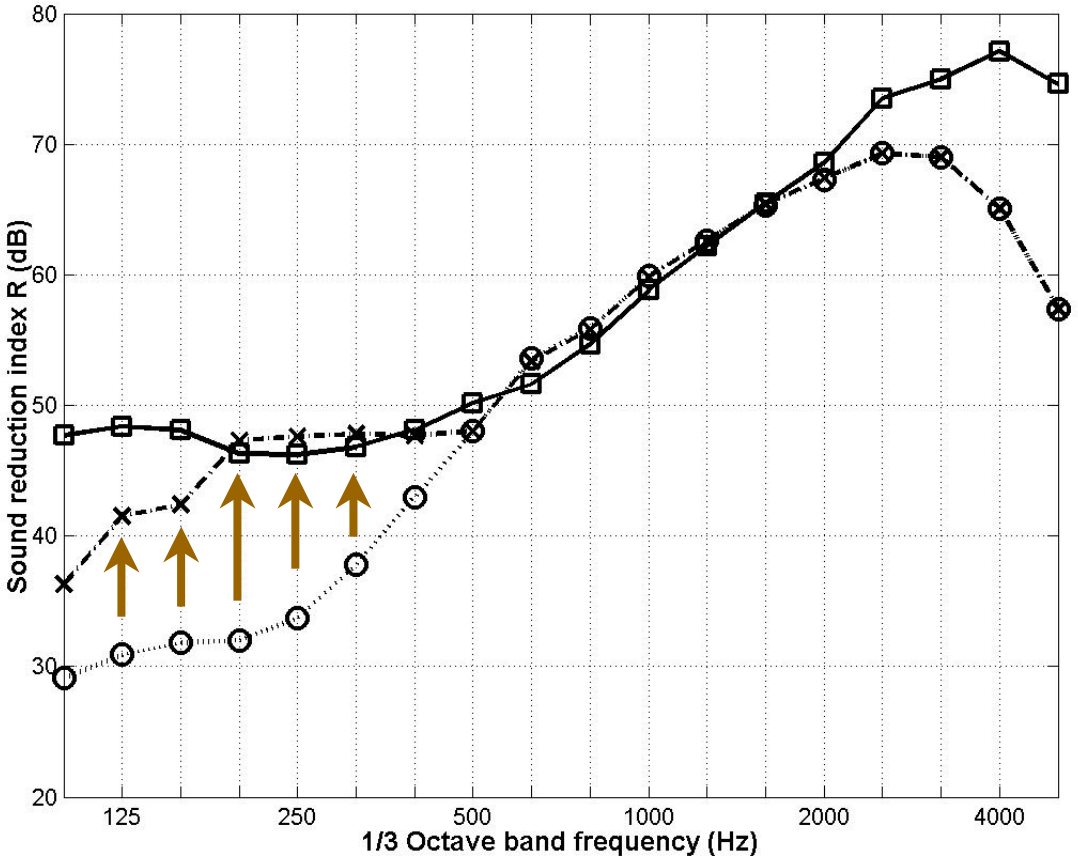
-Abason - BANP

Active ventilation duct

Tests according to ISO 140-3



Active ventilation duct



Sound reduction index

Wall

Rw = 56 (-1 ; -3)

Wall + VENTAC OFF

Rw = 48 (-2 ; -7)

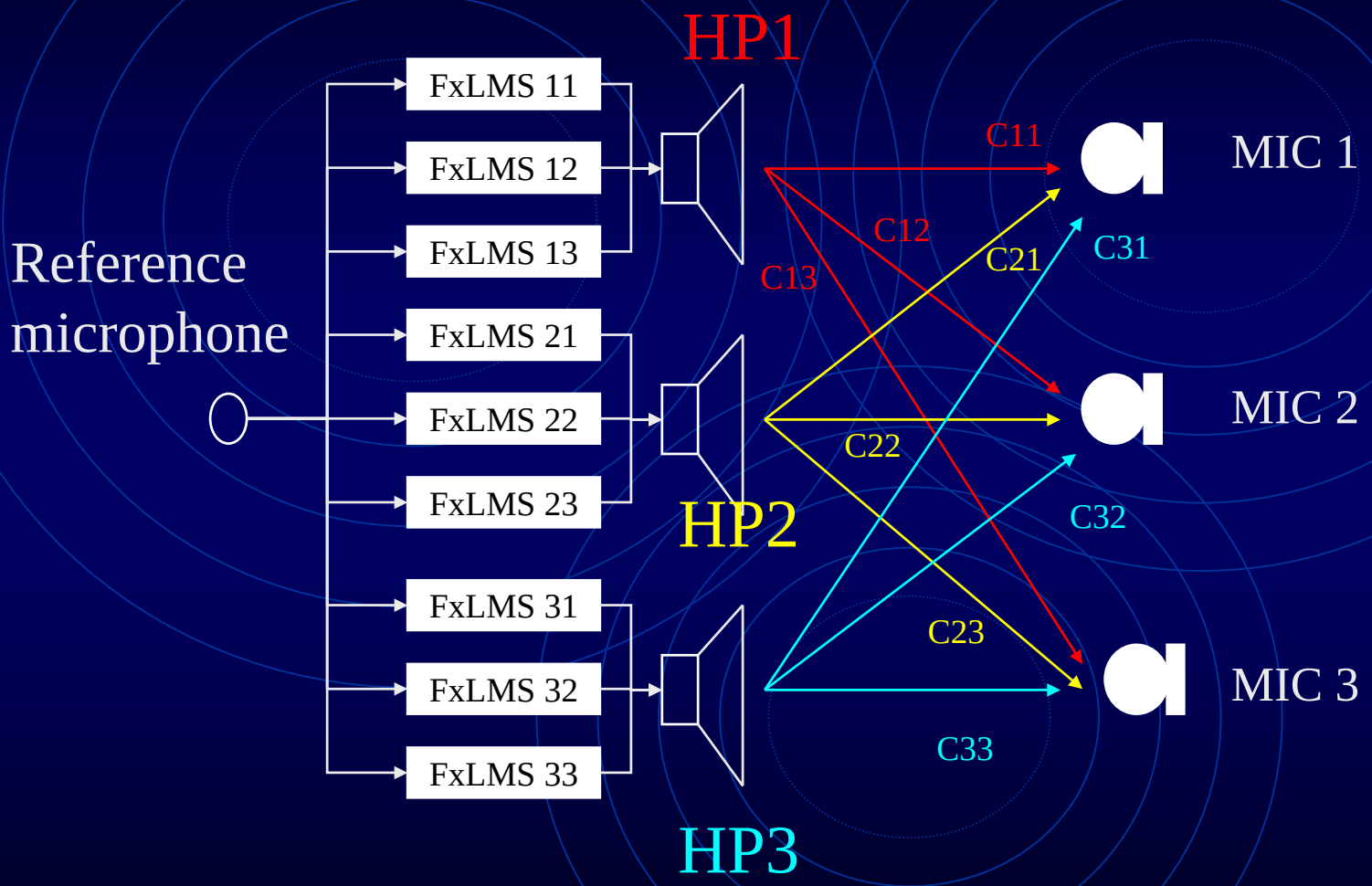
Wall + VENTAC ON

Rw = 56 (-2 ; -5)

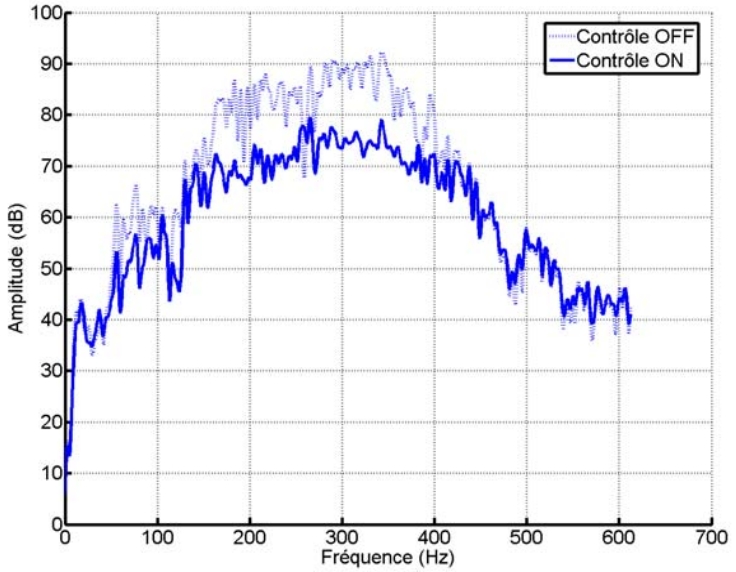
Active shutter box: in the reception room

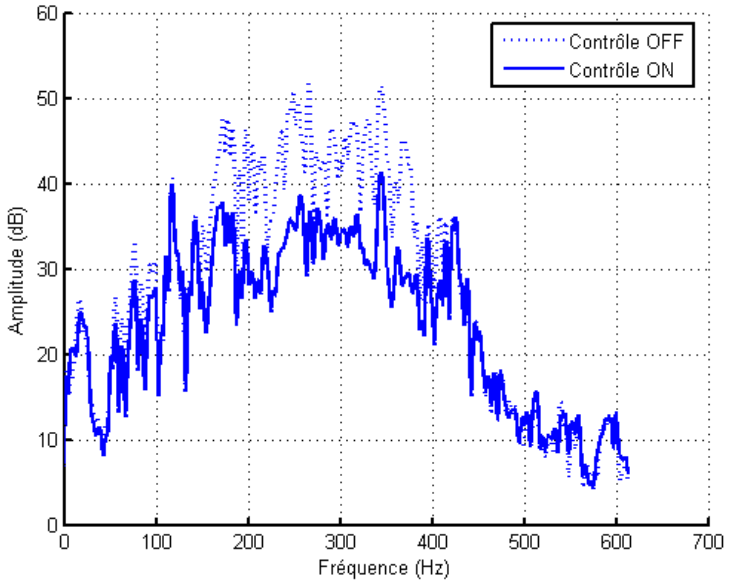
Active shutter box : in the emission room

Active shutter box :signal processing



Active shutter box : results





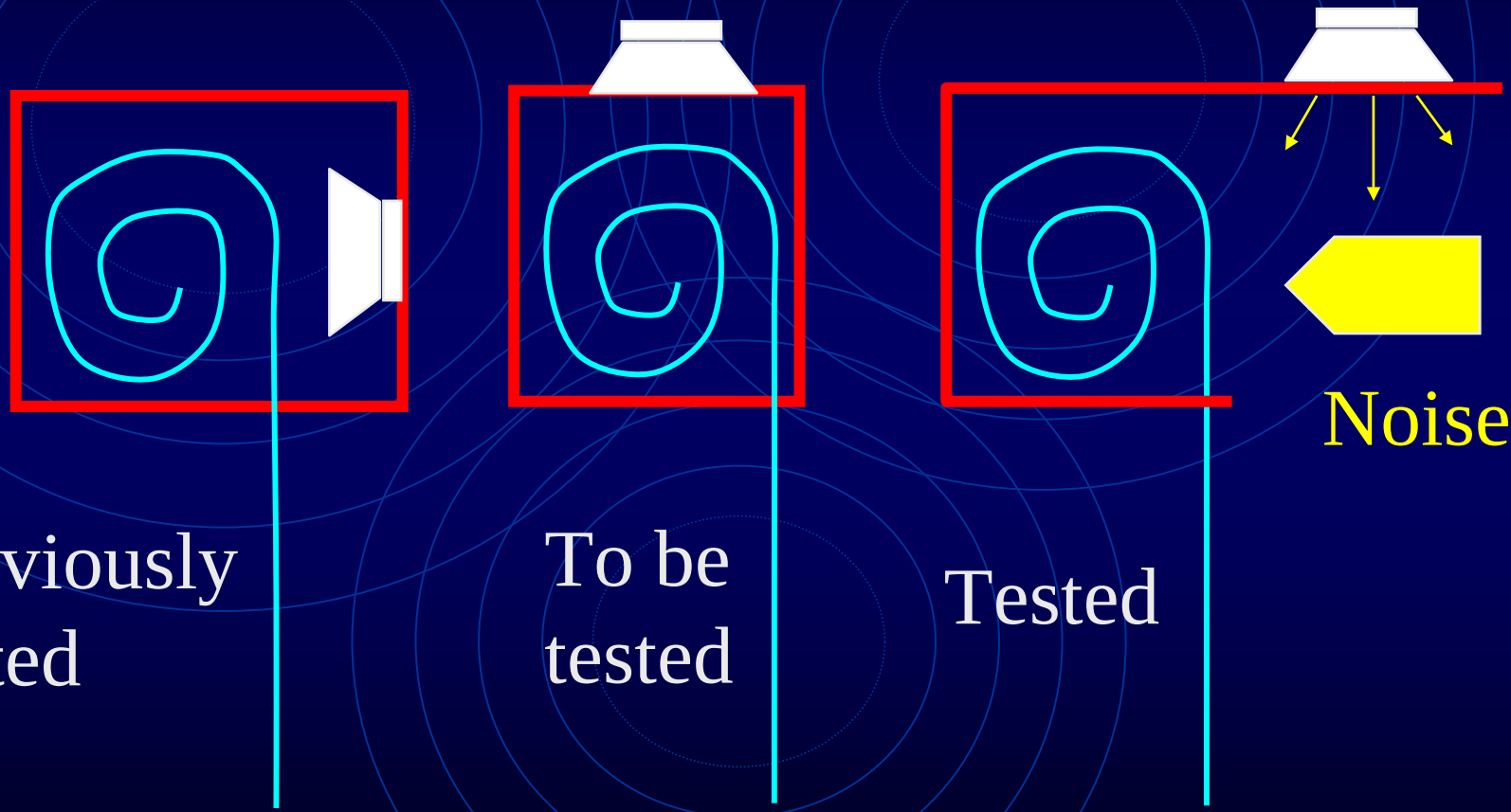
Error microphone

Reception microphone : at 3m from the box

Active shutter box : results

	Error microphone	Micro at 1m	Micro at 3m
Control off	93,4 dBlin / 86,3 dBA	85,1 dBlin / 76,7 dBA	71,8 dBlin / 64,1 dBA
Control on	80,9 dBlin / 73,8 dBA	72,2 dBlin / 64,1 dBA	61,7 dBlin / 53,8 dBA
Attenuation	12,5 dBlin / 12,5 dBA	12,9 dBlin / 12,6 dBA	10,1 dBlin / 10,3 dBA

Active shutter box : upper position of the loudspeakers

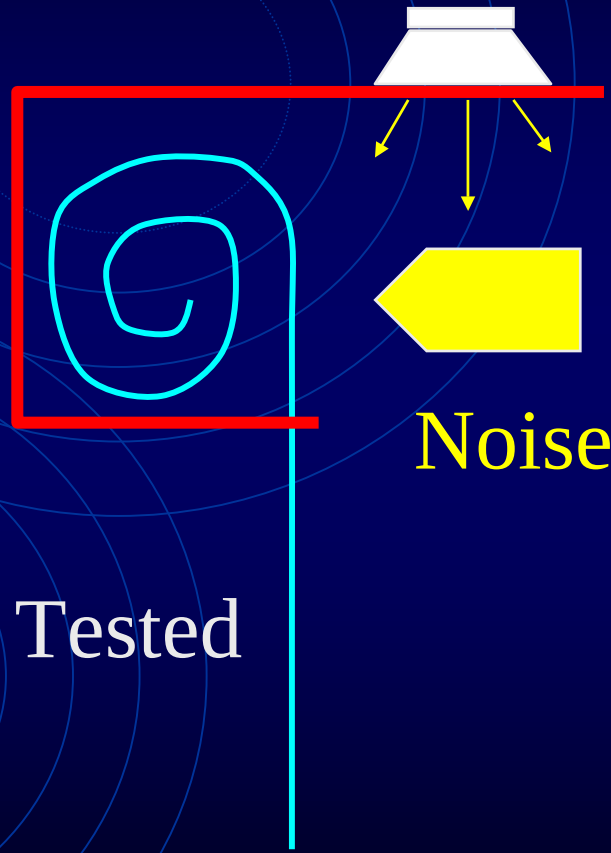


Active shutter box : upper position of the loudspeakers

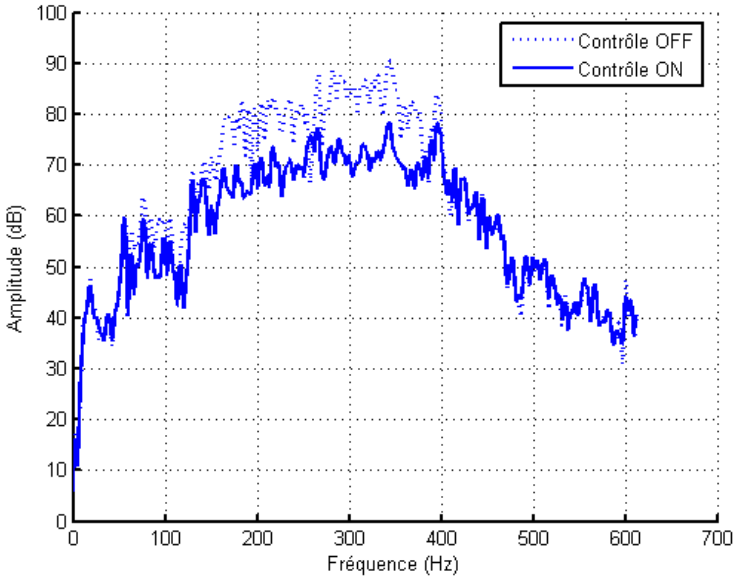
reception

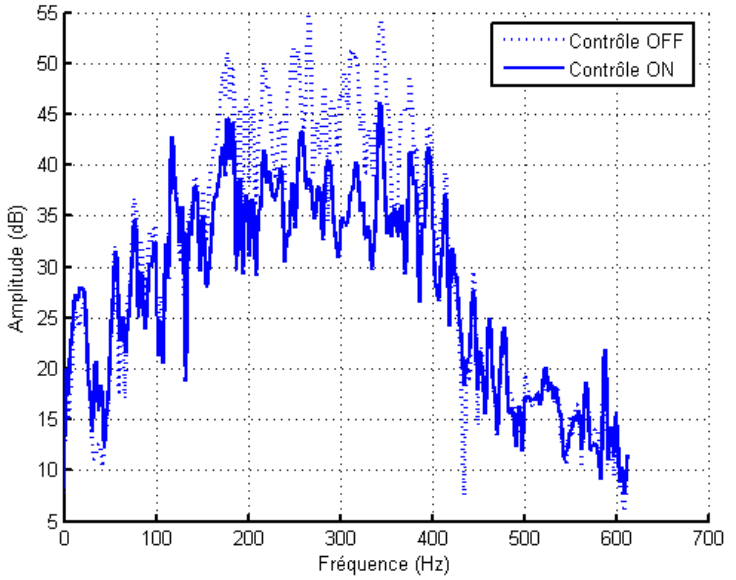
emission

Tested



Active shutter box : upper LS results





Error microphone

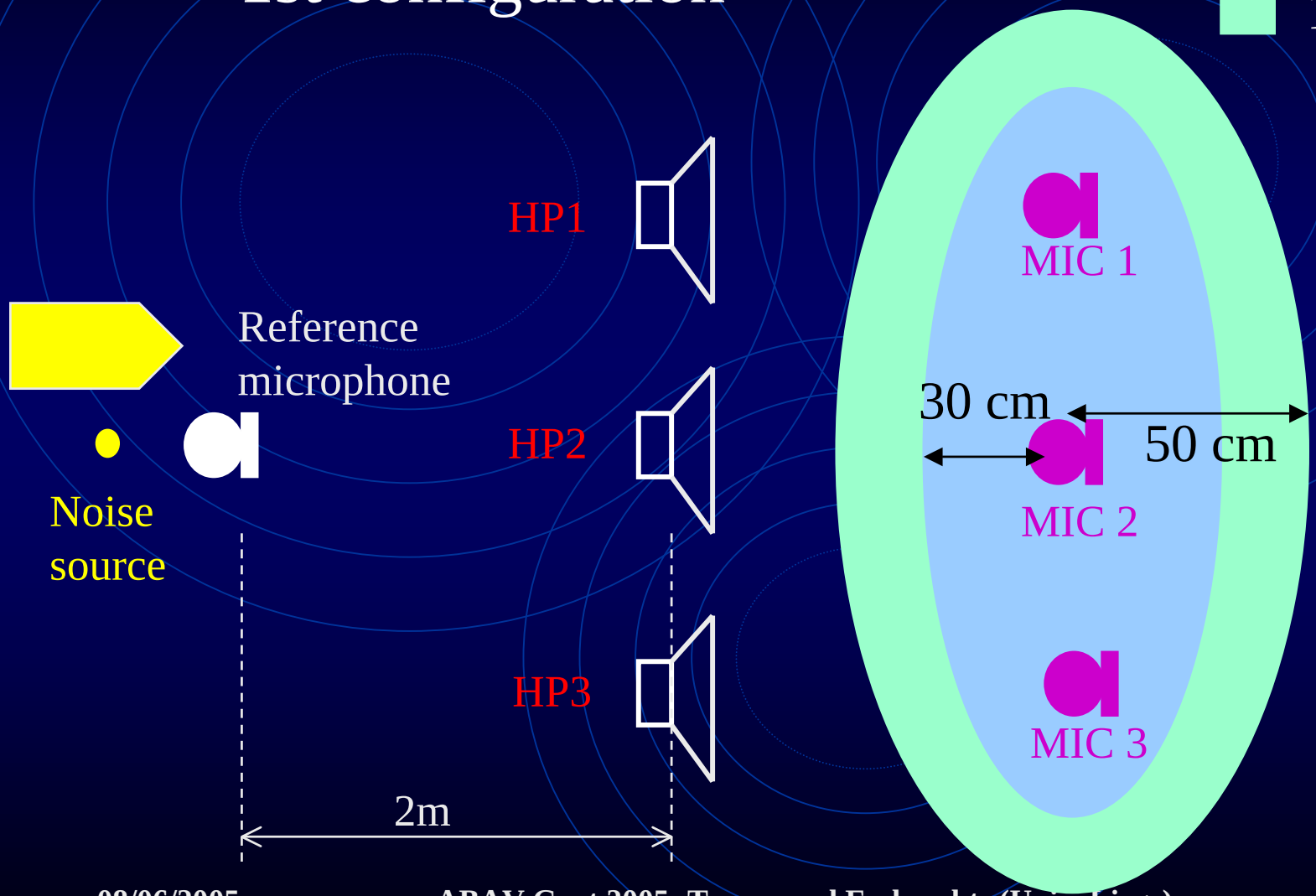
Reception microphone : at 3m from the box

Active shutter box : upper LS results

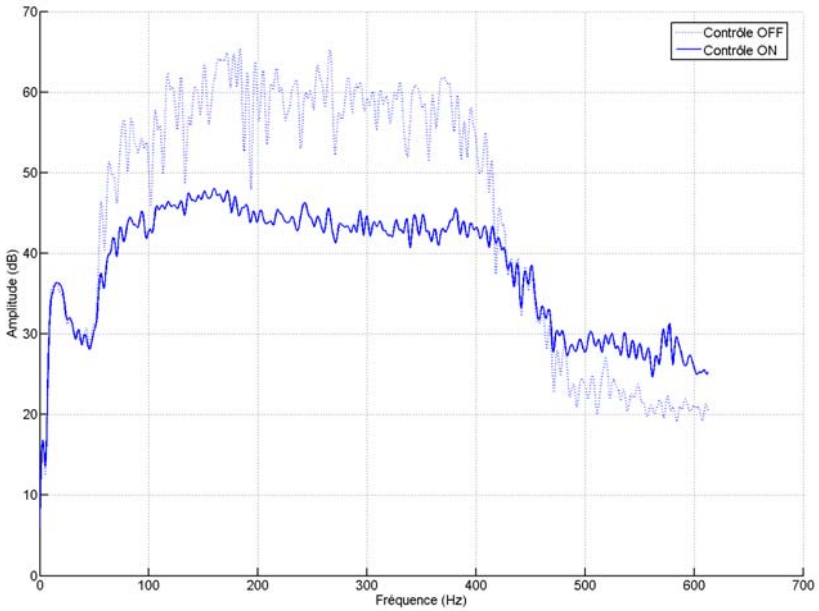
	Error microphone	Micro at 1m	Micro at 3m
Control off	90,3 dBlin / 83,3 dBA	80,9 dBlin / 72,1 dBA	74 dBlin / 66,4 dBA
Control on	79,1 dBlin / 72,4 dBA	70,1 dBlin / 62,6 dBA	66 dBlin / 57,9 dBA
Attenuation	11,2 dBlin / 10,9 dBA	10,8 dBlin / 9,5 dBA	8 dBlin / 8,5 dBA

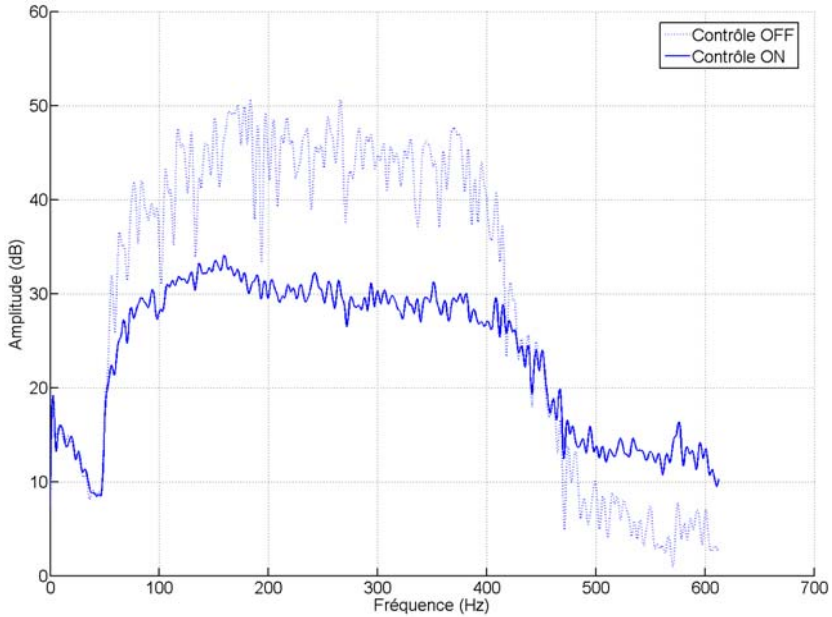
Local active control :

1st configuration



Local active control : 1st configuration



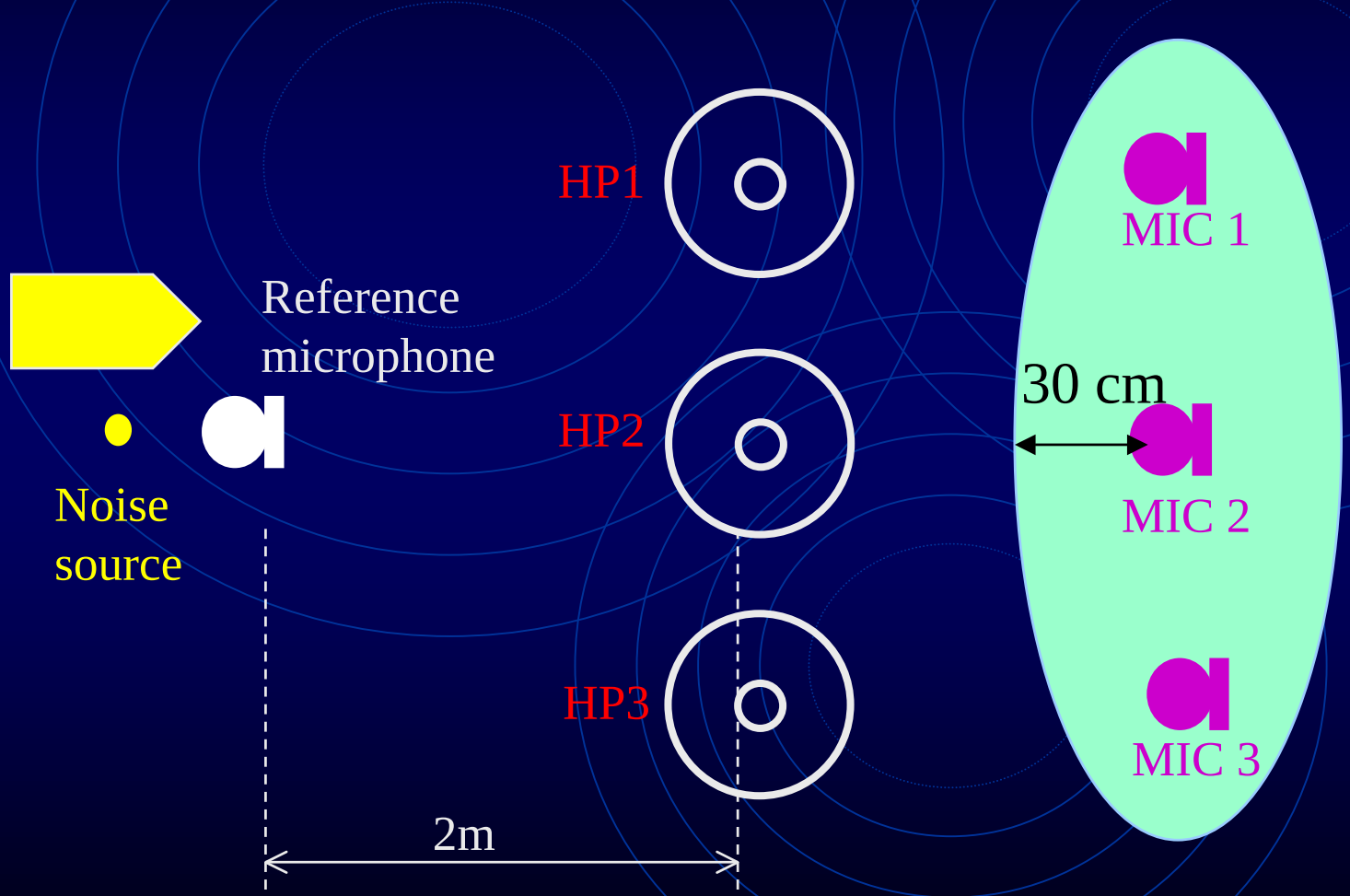


Error microphone :
attenuation 14.9 dB(A)

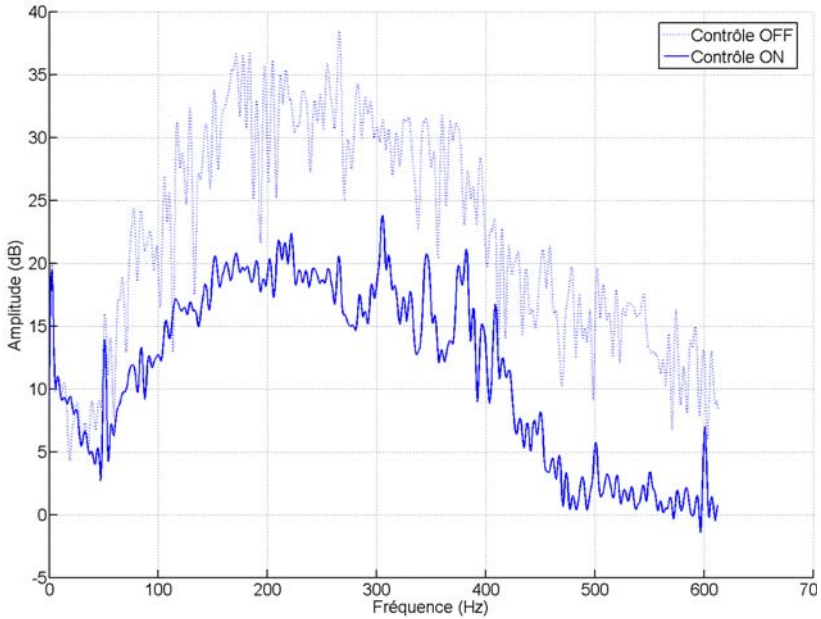
Field microphone :
attenuation 14.8 dB(A)

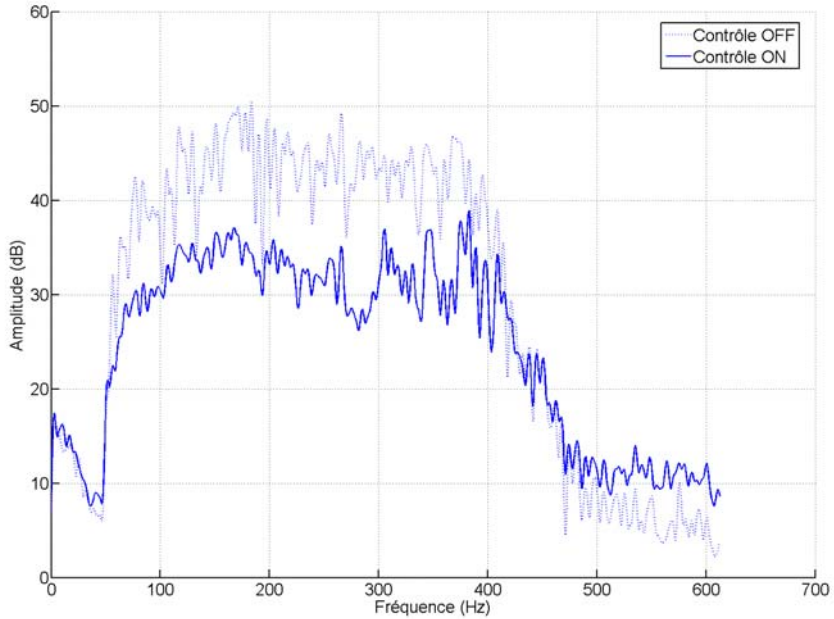
Local active control :

2nd configuration



Local active control : 2nd configuration

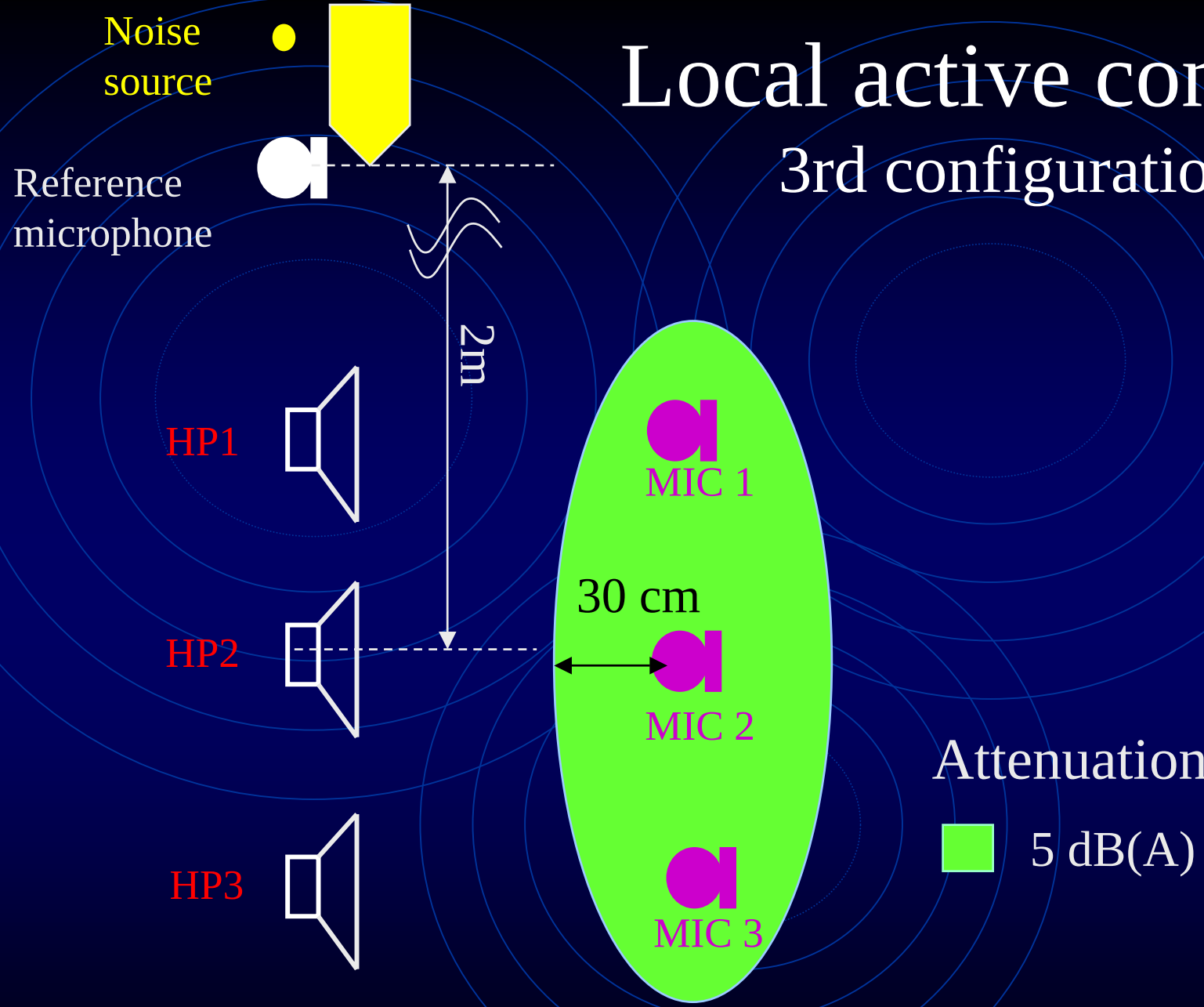




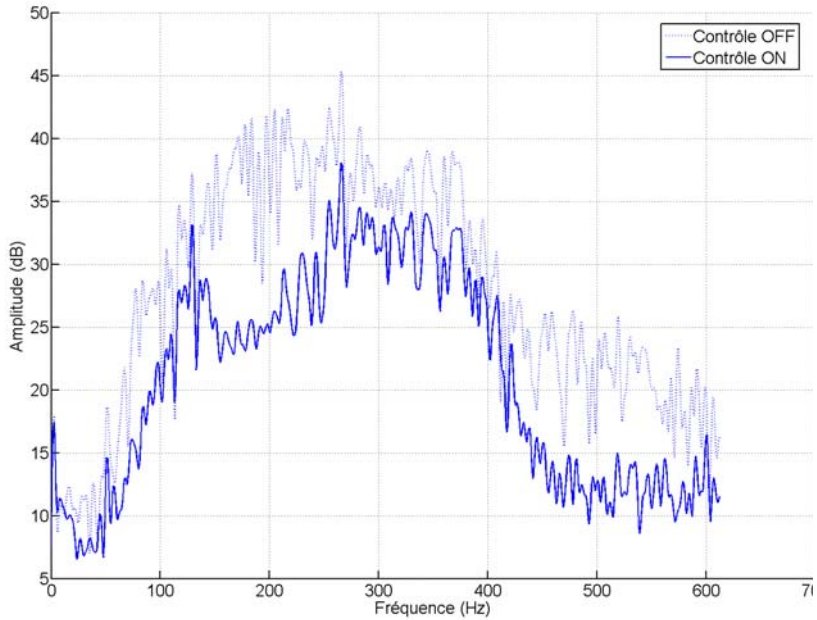
Error microphone :
attenuation 12.9 dB(A)

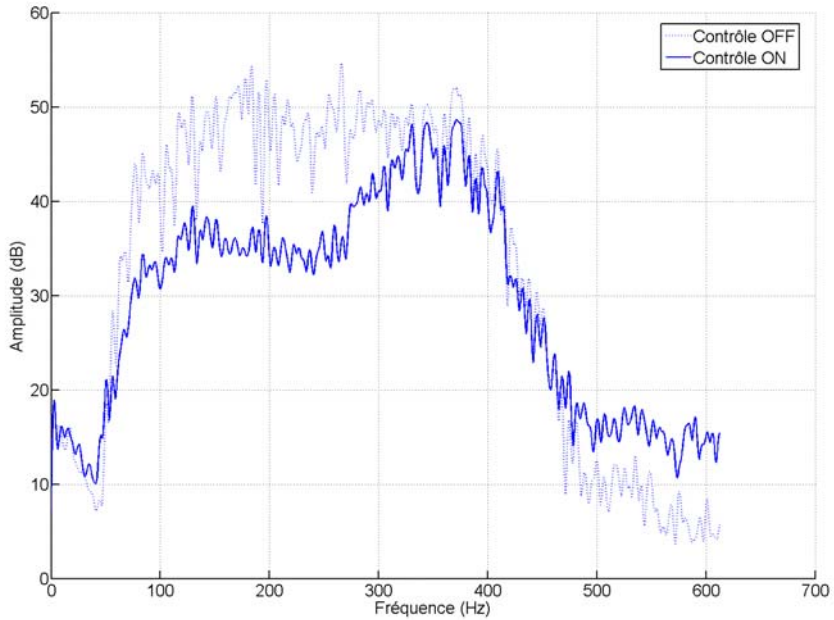
Field microphone :
attenuation 10.7 dB(A)

Local active control :
3rd configuration



Local active control : 3rd configuration





Error microphone :
attenuation 6.2 dB(A)

Field microphone :
attenuation 5.2 dB(A)

Local active control : conclusion

-The best attenuations are obtained between 100 Hz and 400 Hz, with the loudspeakers situated between the noise source and the error microphones and radiating in the sense of the noise propagation;

- Attenuations of 10-15 dB(A) on a zone covering a diameter of 1m can be achieved.

- This is really audible, for sines, white noise and aircraft noise.

- Future works : virtual position for microphones

Conclusion